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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/679,985	10/06/2003	Dzhakhangir V. Khaydarov	04379/000M882-US0	4773

7278 7590 03/27/2007
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EXAMINER

VAN ROY, TOD THOMAS


ART UNIT	PAPER NUMBER
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2828

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/27/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/679,985	Applicant(s) KHAYDAROV, DZHAKHANGIR V.	
	Examiner Tod T. Van Roy 	Art Unit 2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 December 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-26 and 28 is/are rejected.
- 7) ☒ Claim(s) 27 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

The examiner acknowledges the amending of claims 1, 8, 13, 19, and the addition of claims 27-28.

Double Patenting

The previous double patenting rejections are hereby withdrawn due to the current amendments.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-26 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Del Corno et al. (Active-passive mode-locked Nd:YAG laser with passive negative feedback, Optics Letters, Vol.15, No.13, July 1, 1990) in view of Il'ichev et al. (Model of a passively Q-switched laser accounting nonlinear absorption anisotropy in a passive

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switch, Proceedings of Nonlinear Optics: Materials, Fundamentals, and Applications Topical Meeting, 113-115 (1998)) and further in view of Song et al. ("Passively Q-switched diode-pumped continuous-wave Nd:YAG-Cr⁴⁺:YAG laser with high peak power and high pulse energy", Applied optics, Vol.39, No.27, Sept.20, 2000, p.4954-4958).

With respect to claims 1, 5, 7, and 18, Del Corno teaches a laser defining a cavity, the cavity housing a proximal reflective surface (fig.1 M2), a distal reflective surface (fig.1 M1), a beam pathway there between, and, along the beam pathway, a solid-state laser medium (fig.1 Nd:YAG), a source of pulsed energy for energizing the laser medium (col.2 para.2 flashlamps), means for providing an energy output from the cavity (fig.1 POL), and a beam limiting element (fig.1 $\lambda/4$, limiting beam output polarization), the laser comprising: a passive negative feedback (PNF) element (fig.1 NFE) arranged along the beam pathway; and a saturable absorber (SA) element arranged along the beam pathway (fig.1 DC) for Q-switching the laser. Del Corno does not teach the SA to have a recovery time longer than an output pulse, or the location of the SA to be variable and able to effect the pulse duration. Il'ichev teaches a laser system comprising Nd:YAG and a SA that has a long recovery time (approx. 3 μ s) and whose orientation effects the pulse output duration (fig.3). Song teaches a Nd:YAG and SA wherein various positions of the SA within the cavity are taught (fig.1). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the laser and SA of Del Corno with the orientation dependent SA of Il'ichev in order to allow for control of the output pulse characteristics, as well as with the variable positioning of

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Song to allow for proper placement of the SA to account for thermal lensing effects (Song, pg.4957, col.1-2 para.1).

With respect to claims 2-3, Del Corno, Il'ichev, and Song teach the laser of claim 1, and Del Corno teaches pulses in the 10-30ps range (col.4 para.2), when in combination with the pulse variance of Il'ichev (fig.3) would allow for the obvious optimization of the claimed pulse duration ranges.

With respect to claim 4, Del Corno, Il'ichev, and Song teach the laser of claim 1, and Del Corno further teaches the output energy to be about 10uJ (col.4 para.2), but does not teach the output power to be about 100uJ to 2mJ. It would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the output power to a higher level as this has been shown to be within the skill of a general worker in the art (see MPEP 2144.05 II A - "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955)).

With respect to claim 6, Del Corno, Il'ichev, and Song teach the laser of claim 1, and Del Corno further teaches the SA element to be between the proximal reflective surface (fig.1 M2) and the means for outputting from the cavity (fig.1 POL).

With respect to claims 8-9, Del Corno, Il'ichev, and Song teach the laser of claim 1, wherein the orientation taught by Il'ichev comprises orientations between a first and second angle relative to a polarization of the beam in the beam pathway (fig.3d, approx. 0-45 degrees relative to the optical axis).

With respect to claims 10-12, Del Corno and Il'ichev teach the laser of claim 1, wherein the usable SA orientation dependent mediums taught by Il'ichev are LiF:F2 and Cr4+:YAG (Il'ichev, para.3).

Claims 13 and 16 are rejected for the reasons stated in the rejection to claims 1 and 5.

Claims 14 and 24 are rejected for the reasons stated in the rejection to claims 2-3.

Claim 15 is rejected for the reasons stated in the rejection to claim 4.

Claim 17 is rejected for the reasons stated in the rejection to claim 6.

Claims 19-20 are rejected for the reasons stated in the rejection to claims 8-9.

Claims 21-23 are rejected for the reasons stated in the rejection to claims 10-12.

With respect to claims 25-26, Del Corno, Il'ichev, and Song teach the laser of claims 1 and 13, but do not teach the SA element to be rotatably mounted. It would have been obvious to one of ordinary skill in the art at the time of the invention to rotatably mount the SA element of Del Corno with the orientation dependent SA of Il'ichev in order to allow for the adjustment of the SA angle with respect to the optical axis while using a sturdy optical support structure.

With respect to claim 28, Del Corno, Il'ichev, and Song teach the laser outlined in the rejection to claim 1, including an acousto-optic mode-locker (Del Corno, fig.1 AOML), but do not specifically teach the SA to be located between the PNF element and the AOML. It would have been obvious to one of ordinary skill in the art at the time of the invention to place the SA between the PNF and the AOML as this position would

place the SA near to the gain medium, and would allow for a minimal affect of thermal lensing (Song, pg.4957 col.2 para.1).

Allowable Subject Matter

Claim 27 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Claim 27 is believed to be allowable as a laser system containing the elements defined in both claims 1 and 27, and in the particular order as limited by claim 27 was not found to be taught in the prior art. Prior art was found to teach similar systems (Del Corno) that did not teach all claimed elements (half-wave plate) and additionally did not teach the particular arrangement of the elements. As the prior art failed to disclose these limitations, or provide motivation to reconfigure known systems, claim 27 is believed to be allowable.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

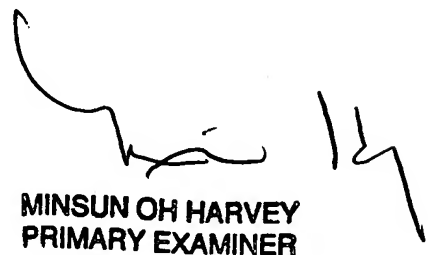
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tod T. Van Roy whose telephone number is (571)272-8447. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on (571)272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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PRIMARY EXAMINER